

Notice of Allowability

Application No.

10/608,826

Examiner

Thanh D. Vo

Applicant(s)

BUCHANAN ET AL.

Art Unit

2189

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Amendment filed on September 28, 2006 and telephone interview on December 8, 2006.
2. ☒ The allowed claim(s) is/are 1-6,9,11-13,18,20-25,27 and 29-38.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Scott Thorp on December 8, 2006.

2. The application has been amended as follows:

Claim 1. (Currently Amended) An apparatus for alternate control of a storage array, the apparatus comprising: a RAID controller operably connected to a storage array, the RAID controller configured to receive storage commands from a host computer and execute corresponding operations on the storage array;

a storage adapter residing on the host computer, the storage adapter operably connected to the storage array independent of the RAID controller, the storage adapter configured to transmit storage commands to a selected storage device within the storage array;

an augmented services module residing on the host computer, wherein the augmented services module performs services on the selected storage device within the storage array when said services are not available on the RAID controller; and

a control module residing on the host computer, the control module configured to selectively direct storage commands to the RAID controller and the storage adapter, wherein in response to detecting a RAID controller fault the control module retrieves RAID configuration information from the RAID controller, quiesces the RAID controller, and directs storage commands to the storage adapter so that the storage adapter emulates the RAID controller in conducting RAID operations on the storage array.

Claim 2. (Previously Presented) The apparatus of claim 1, wherein the storage adapter is selected from the group consisting of a SCSI adapter, an SSA adapter, a fiberchannel adapter, and an IDE adapter.

Claim 3. (Previously Presented) The apparatus of claim 1, wherein the control module comprises a multipath software layer.

Claim 4. (Previously Presented) The apparatus of claim 1, wherein the RAID controller is selected from the group consisting of a SCSI RAID controller, an SSA RAID controller, a fiberchannel RAID controller, and an IDE RAID controller.

Claim 5. (Previously Presented) The apparatus of claim 1, wherein the RAID controller resides on the host computer.

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Claim 6. (Previously Presented) The apparatus of claim 1, further comprising a controller adapter residing on the host computer, the controller adapter configured to operably connect the host computer and the RAID controller.

Claims 7-8. (Canceled)

Claim 9. (Previously Presented) The apparatus of claim 1, wherein the control module is further configured to disable the RAID controller.

Claim 10. (Canceled)

Claim 11. (Previously Presented) The apparatus of claim 1, wherein the control module is further configured to conduct operations selected from the group consisting of read operations, write operations, recovery operations, formatting operations, and firmware update operations.

Claim 12. (Previously Presented) The apparatus of claim 1, wherein the control module comprises a driver configured to translate operating system calls to storage commands.

Claim 13. (Currently Amended) A method for alternate control of a storage array, the method comprising:

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transmitting storage commands to a RAID controller configured to conduct storage operations on a storage array;

transmitting storage commands via a storage adapter to a selected storage device within the storage array, wherein the storage adapter is operably connected to the storage array independent of the RAID controller; and

directing an augmented services module to perform services on the selected storage device within the storage array when said services are not available on the RAID controller; and

selectively directing storage commands to the RAID controller and the storage adapter, wherein storage commands are directed to the storage adapter in response to detecting a RAID controller fault by retrieving RAID configuration information from the RAID controller, quiescing the RAID controller, and directing storage commands to the storage adapter so that the storage emulates the RAID controller in conducting RAID operations on the storage array.

Claims 14-17. (Canceled)

Claim 18. (Previously Presented) The method of claim 13, further comprising disabling the RAID controller.

Claim 19. (Canceled)

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Claim 20. (Previously Presented) The method of claim 13, further comprising conducting storage operations via the storage adapter, wherein the storage operations are selected from the group consisting of read operations, write operations, recovery operations, formatting operations, and firmware update operations.

Claim 21. (Previously Presented) The method of claim 13, further comprising disabling the storage adapter.

Claim 22. (Previously Presented) The method of claim 13, further comprising quiescing the storage adapter.

Claim 23. (Previously Presented) The method of claim 13, further comprising translating operating system calls to storage operations.

Claim 24. (Currently Amended) A system for alternate control of a storage array, the system comprising:

- a host computer;

- a storage array comprising a plurality of storage devices;

- a RAID controller operably connected to the storage array, the RAID controller configured to receive storage commands and conduct storage operations on the storage array in response to commands received from the host computer;

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a storage adapter operably connected to the storage array independent of a storage controller, the storage adapter configured to transmit storage commands to a selected storage device within the storage array; and

an augmented services module residing on the host computer, wherein the augmented services module performs services on the selected storage device within the storage array when said services are not available on the RAID controller; and

a control module residing on the host computer, the control module configured to selectively direct storage commands to the RAID controller and the storage adapter, wherein in response to detecting a RAID controller fault the control module retrieves RAID configuration information from the RAID controller, quiesces the RAID controller, and directs storage commands to the storage adapter so that the storage adapter emulates the RAID controller in conducting RAID operations on the storage array.

Claim 25. (Currently Amended) A computer readable storage medium comprising computer readable program code for alternate control of a storage array, the program code configured to:

transmit storage commands to a RAID controller configured to conduct RAID operations on a storage array;

transmit storage commands via a storage adapter to a selected storage device within the storage array, wherein the storage adapter is operably connected to the storage array independent of the RAID controller; and

directing an augmented services module to perform services on the selected storage device within the storage array when said services are not available on the RAID controller; and

selectively direct storage commands to the RAID controller and the storage adapter, wherein storage commands are directed to the storage adapter in response to detecting a RAID controller fault by retrieving RAID configuration information from the RAID controller, quiescing the RAID controller, and directing storage commands to the storage adapter so that the storage emulates the RAID controller in conducting RAID operations on the storage array.

Claim 26. (Canceled)

Claim 27. (Currently Amended) The computer readable [[program code]] storage medium of claim 25, wherein the program code is further configured to disable the RAID controller.

Claim 28. (Canceled)

Claim 29. (Currently Amended) A method for servicing a storage array, the method comprising:

operably connecting a storage array to a storage adapter independent of a RAID controller, the storage adapter configured to transmit storage commands to a selected

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storage device within the storage array, the storage adapter residing in a host computer; and

directing an augmented services module residing on the host computer to perform services on the selected storage device within the storage array when said services are not available on the RAID controller; and

installing a control module residing on the host computer, the control module configured to selectively direct storage commands to the RAID controller and the storage adapter, wherein in response to detecting a RAID controller fault the control module retrieves RAID configuration information from the RAID controller, quiesces the RAID controller, and directs storage commands to the storage adapter so that the storage adapter emulates the RAID controller in conducting RAID operations on the storage array.

Claim 30. (Previously Presented) The method of claim 29, further comprising disabling the RAID controller.

Claim 31. (Previously Presented) The method of claim 29, further comprising transferring control of the storage array to the storage adapter.

Claim 32. (Previously Presented) The method of claim 29, further comprising servicing the RAID controller.

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Claim 33. (Previously Presented) The method of claim 29, further comprising updating firmware within a storage device.

Claim 34. (Previously Presented) The method of claim 29, further comprising conducting diagnostic operations.

Claim 35. (Previously Presented) The method of claim 29, further comprising conducting recovery operations.

Claim 36. (Previously Presented) The system of claim 24, wherein the RAID storage operations are selected from the group consisting of read operations, write operations, recovery operations, formatting operations, and firmware update operations.

Claim 37. (Current Amended) The computer readable [[program code]] storage medium of claim 25, wherein the RAID storage operations are selected from the group consisting of read operations, write operations, recovery operations, formatting operations, and firmware update operations.

Claim 38. (Previously Presented) The method of claim 29, wherein the RAID storage operations are selected from the group consisting of read operations, write operations, recovery operations, formatting operations, and firmware update operations.

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Claim 38. (Previously Presented) The method of claim 29, wherein the RAID storage operations are selected from the group consisting of read operations, write operations, recovery operations, formatting operations, and firmware update operations.

Reason for Allowance

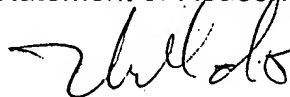
3. The following is an examiner's statement of reasons for allowance:

With respect to independent claims 1, 13, 24, 25, and 29:

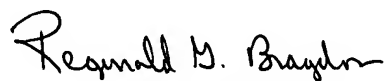
Combination of teaching in Smith (US 2004/0103337) and Wang et al. (US 6,834,326) disclose all of the limitations except the following: "an augmented services module residing on the host computer, wherein the augmented services module performs services on the selected storage device within the storage array when said services are not available on the RAID controller".

For the reason thereof, amended claims 1, 13, 24, 25, and 29 and their corresponding dependent claims are in the condition for allowance.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."



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12/11/2006



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